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DESCRIPTION

VEHICLE HORN

[Technical Field]

The present invention relates to a vehicle horn that is mounted on a vehicle such as a car, a motorcycle and a special-purpose vehicle.

[Background Art]

Generally, as this type of vehicle horn, known is a vehicle horn with the following structure. Namely the vehicle horn has a recessed part projected outside which is formed on a bottom piece part of a cylindrical casing with a bottom, an exciting coil which is formed by winding a winding wire around a coil bobbin and is housed in the recessed part. In a cylinder of the casing is properly provided a fixed iron core, a movable iron core displaced in an axis direction in a state of being brought into contact with or separated from the fixed iron core based on excitation/non-excitation of the exciting coil, a fixed contact, a movable contact intermittently switched based on the displacement of the movable iron coil in relation to the fixed contact or the like. And further a terminal member provided with a pair of terminals for supplying electric power to the exciting coil is arranged on an outer surface of the bottom piece part of the casing. In this type of vehicle horn,

a warning sound is generated based on repeated intermittent switching between the movable contact and the fixed contact. Meanwhile, an electrical noise is generated by arc discharge at the time of generating a warning sound. Such noise often has an impact on other electronic equipment. Thus, prevention of the noise has been proposed in recent years.

As an improvement measure, it has been proposed to prevent the noise by connecting a noise preventing member to a wiring circuit of the fixed contact, the movable contact and the exciting coil in parallel. For example, a vehicle horn constituted in such a manner that a capacitor employed as the noise preventing member is fixed to an outer diameter part of the coil bobbin in the cylinder of the casing with a specific locking piece (Japanese Published Examined Utility Model Application No. Sho-51-22612), a vehicle horn in which the noise preventing member, in itself, is miniaturized by employing a varistor as the noise preventing member, and the varistor is provided in the vicinity of a fixed part where a plate for the fixed contact and a plate for the movable contact in the cylinder of the casing are fixed in an insulation-shape (Japanese Published Unexamined Patent Application No. Hei-5-48000), or the like, has been proposed.

On the other hand, miniaturization of the vehicle horn has been strongly requested, and also miniaturization of the casing of the vehicle horn has been strongly demanded. However, both the vehicle horns disclosed in Japanese Published Examined

Utility Model Application No. Sho-51-22612 and Japanese Published Unexamined Patent Application No. Hei-5-48000 are structured so as to provide the noise preventing member in the cylinder of the casing. Thus, it is necessary to consider the rise of the temperature in the cylinder and to ensure a space for the noise preventing member, and the miniaturization of the casing can be hardly realized. In addition, an exclusive member for fixing the noise preventing member becomes necessary for these vehicle horns, and not only does the structure become complicated but also the cost increases. These problems are to be solved by the present invention.

[Disclosure of the Invention]

The present invention was made in order to solve the above problems. The invention of claim 1 is a vehicle horn constituted in such a manner that a recessed part projected outside is formed on a bottom piece part of a cylindrical casing with a bottom, a coil bobbin of an exciting coil is housed in the recessed part and a terminal member provided with terminal plates for supplying electric power to a winding of the exciting coil is arranged on an outer surface of the bottom piece part of the casing, wherein a noise preventing member is provided in the terminal member.

Thus, the inner temperature of the casing has no impact on the noise preventing member and the casing can be miniaturized.

In the invention of claim 2, the terminal member is provided with a pair of terminal plates, and the noise preventing member is provided between the pair of terminal plates. Thus, the inner temperature of the casing has no impact on the noise preventing member and the casing can be miniaturized.

In the invention of claim 3, the terminal member is made as a terminal unit in which the noise preventing member is built beforehand and the terminal unit is attached to an outer diameter side part of the recessed part of the bottom piece part of the casing in the invention of claim 1 or 2. Thus, assembling work can be simplified.

In the invention of claim 4, the terminal member is provided so as not to be projected further outside than the recessed part of the bottom piece part of the casing in the invention of claim 1, 2 or 3. Thus, when the horn is installed, a space between it and other members can be reduced.

In the invention of claim 5, the noise preventing member is provided in a space formed in the terminal member and the space is filled with a resin material in the invention of claim 1, 2, 3 or 4. Thus, the noise preventing member can be protected and reliably fixed.

According to the invention of claim 1, since the inner temperature of the casing has no impact on the noise preventing member, the noise preventing member can be protected. In addition, the casing can be miniaturized.

According to the invention of claim 2, because the inner temperature of the casing has no impact on the noise preventing member, the noise preventing member can be protected. In addition, the casing can be miniaturized.

According to the invention of claim 3, the assembling work can be simplified.

According to the invention of claim 4, when the horn is installed, the space between it and other members can be reduced.

According to the invention of claim 5, the noise preventing member can be protected and reliably fixed.

[Brief Description of the Drawings]

Fig. 1 is a partial side cross sectional view of a horn;

Fig. 2 is a front view of a state where members are attached to a casing;

Fig. 3 is a rear view of the horn;

Fig. 4(A) is a front view of a terminal unit, and Fig. 4(B) is a rear view of the terminal unit; and

Fig. 5(A) is a cross sectional view taken along line X-X in Fig. 4(A), Fig. 5(B) is a plan view of Fig. 4(A), and Fig. 5(C) is a cross sectional view taken along line X-X in Fig. 4(B).

[Best Mode for Carrying Out the Invention]

Next, an embodiment of the present invention will be

described hereinafter with reference to Figs. 1 to 5.

In the figures, the reference numeral 1 denotes a vehicle horn, and a casing 2 constituting the horn 1 is formed cylindrically with a bottom. A recessed part 2b projecting outside is formed on the center part of a bottom piece part 2a of the casing 2. A fixed iron core 3 penetrates an axially center part of the recessed part 2 and is supported position-adjustably in an axial direction by a fixing nut 3a.

The reference numeral 4 denotes a coil bobbin. The coil bobbin 4 is composed of a cylinder 4a and flanges 4b, which are extended to outer diameter sides of both ends of the cylinder 4a respectively and are integrally formed with the cylinder 4a. An exciting coil C is constituted in such a manner that a winding 5 is wound around the periphery of the cylinder 4a. The coil bobbin 4 is housed in the recessed part 2b with the fixed iron core 3 inserted into the cylinder 4a and the flanges 4b supported by the bottom piece part 2a of the casing 2. Further, an attachment piece part 4c and a terminal fixing piece part 4d, which are faced to each other in radial direction and projected toward an outer diameter, are integrally formed on a peripheral edge of the flange 4b of the coil bobbin 4 at the opening side of the casing 2. The attachment piece part 4c is fixed to an outer diameter side bottom piece part 2c formed at an outer diameter side of the recessed part 2b of the casing 2 via a pin 2d.

The terminal fixing part 4d is arranged at a facing part

of a pair of through holes 2e, 2f opened in a circumference direction of the casing outer diameter side bottom piece part 2c. A pair of through holes 4e, 4f are opened which penetrate the casing through holes 2e, 2f respectively. An end 5a of the winding 5 constituting the exciting coil C is pulled out and wired from the coil bobbin cylinder 4a in the vicinity of the through hole 4e among the pair of through holes 4e, 4f. As described below, a first terminal pin 6 made of a conductive member is provided so as to penetrate coil bobbin through hole 4e and the casing through hole 2e. Therefore the winding end 5a is electrically connected to the first terminal pin 6.

Additionally, the other end 5b of the winding 5 of the exciting coil C is pulled out and wired from the cylinder 4a in the vicinity of the coil bobbin through hole 4f. Further, a base end 7b of a fixing plate 7, which is constituted by the conductive plate member and in which a through hole 7a is opened, and a base end 8b of a movable plate 8, which is constituted by the conductive plate member and in which a through hole 8a is opened, are provided aside of the through hole 4f. A second terminal pin 9 made of a conductive member is provided so as to penetrate the coil bobbin through hole 4f, the fixing plate through hole 7a, the movable through hole 8a and the casing through hole 2f, respectively. Therefore, the fixing plate 7 is electrically connected to the second terminal pin 9 and the movable plate 8 is insulated from the second terminal pin 9, and the movable plate 8 is electrically connected to the

other winding end 5b. In addition, an insulating material 10 is interposed between the fixing plate 7 and the movable plate 8, and therefore the fixing plate 7 is insulated from the movable plate 8. Moreover, a top end 7c of the fixing plate 7 is fixed by a fixing piece 4g extended from the flange 4b of the coil bobbin 4 at the opening side of the casing 2.

A fixed contact 7d is formed on the fixing plate 7 so as to be projected toward the movable plate 8 side, a movable contact 8c facing the fixed contact 7d is formed on the movable plate 8 so as to be projected toward the fixing plate 7 side. The movable contact 8c is brought into contact with and electrically connected to the fixed contact 7d in the natural state. Thus, when electric power is supplied via the first and second terminal pins 6, 9 in the contact state, electric power is supplied to the exciting coil C.

A peripheral edge of a diaphragm 11 is integrally fixed to an opening edge of the casing 2, and a long shaft-shaped movable iron core 12 is integrally provided at the center of the diaphragm 11. An end surface 12a of the movable iron core 12 is arranged so as to adjacently face an end surface (inside top end surface) 3b of the fixed iron core 3 inside the casing 2 with a predetermined gap G. Further, as described above, the exciting coil C is supplied with the electric power to magnetize the fixed iron core 3 so that the movable iron core 12 is attracted to the fixed iron core 3 based on the flexibility of the diaphragm 11 and displaced.

A step 12b is formed on a peripheral surface of the movable iron core 12. The step 12b forcibly displaces the movable plate 8 in a direction, where it moves away from the fixed plate 7, based on the displacement of the movable iron core 12 toward the fixed iron core 3 side, and makes the movable contact 8c move away from the fixed contact 7d. In this state, the exciting coil C is not energized and degaussed.

The reference numeral 13 denotes a terminal unit (corresponding to the terminal member of the present invention) in which penetrating top ends of the first and second terminal pins 6, 9 projected to the outer surface of the casing outer diameter side bottom piece part 2c are housed. A case body 14 constituting the terminal unit 13 includes a bottom piece 14a along the casing outer diameter side bottom piece part 2c and is formed in a box-shape, and a space S is formed between side pieces 14b, 14c provided at both ends in the circumference direction respectively. Base ends 15a, 16a of the first and second terminal plates (corresponding to a pair of terminal plates of the present invention) 15, 16 are buried in the side pieces 14b, 14c respectively. A pair of through holes 14d, 14e respectively formed in the side pieces 14b, 14c are provided so as to respectively communicate with through holes 15b, 16b respectively formed in the base ends 15a, 16a. The penetrating top ends of the first and second terminal pins 6, 9 penetrating from the inside of the casing 2 are made to penetrate the through holes 14e, 14f and the through holes 15b, 16b respectively.

Thus, the first and second terminal pins 6, 9 are electrically connected to the first and second terminal plates 15, 16 respectively.

A capacitor 17 which is a noise preventing member is housed in the space S formed between the side pieces 14b, 14c of the case body 14. A pair of connecting lines 17a, 17b extended from the capacitor 17 are electrically connected to the first and second terminal plates 15, 16 exposed outside via notches 14f, 14g respectively formed on the side pieces 14b, 14c so as to communicate with the space S, respectively, by means of such as soldering. Thus, the noise preventing member 17 is arranged in such wiring state as to be connected to a contact part of the fixed contact 7d and the movable contact 8c in parallel.

The space S, in which the noise preventing member 17 is provided, is filled with an insulating resin material 18, and thus the noise preventing member 17 is buried by the resin material 18.

With the structure mentioned above the terminal unit 13 is attached to the casing 2 in the following manner. Namely, the bottom piece 14a is brought into contact with the casing outer diameter side bottom piece part 2c, the resin material 18 filling side is exposed outside, the first and second terminal pins 6 and 9 projected outside from the casing outer diameter side bottom piece part 2c are inserted into the casing through holes 14d, 14e and the first and second terminal plate

through holes 15b, 16b respectively, and the penetrating top ends of the first and second terminal pins 6, 9 are caulked. By this attachment, the casing 2, the coil bobbin 4, the fixing plate 7, the movable plate 8, the one winding end 5a and the other winding end 5b are electrically connected to each other as described above and integrally fixed, the first and second terminal pins 6, 9 are electrically connected to the first and second terminal plates 15 and 16 respectively, and the terminal unit 13 is integrally fixed to the casing 2 by one caulking operation.

Here, a side piece (inner diameter side piece) 14h of an inner diameter side of the case body 14 is formed in an arc-shape so as to adjacently face the peripheral surface of the casing recessed part 2b, and the thickness T of the case body 14 in an axial direction (the thickness in a box depth direction) is set so as to be smaller than the projecting amount of the casing recessed part 2b toward the outside. The terminal unit 13 is set so as not to be projected further outside than the bottom piece part 2a when attached to the casing.

Moreover, top ends of the first and second terminal plates 15, 16 are projected toward the outer diameter side from a side piece 14i in an outer diameter side of casing body 14, and an outer coupler (not shown) is fitted with the projecting part. The electric power is supplied to the first and second terminal pins 6, 9 via the first and second terminal plates 15, 16 from the outside and sent to the exciting coil C.

In the horn 1 thus structured, when switching operation (not shown) is performed, the electric power is supplied to the first and second terminal pins 6, 9, the exciting coil C is energized and excited via the fixed contact 7d and the movable contact 8c brought into contact with each other, and the movable iron core 12 is displaced toward the fixed iron core 3 side. Thus, the movable contact 8c moves away from the fixed contact 7d, and the exciting coil C is not energized. Then the movable iron coil 12 moves away from the fixed iron core 3, and thus the movable contact 8c comes into contact with the fixed contact 7d again and the exciting coil C is excited. A warning sound is generated by repeating this operation.

As described above, in the embodiment structured as the above, when the electric power is supplied to the first and second terminal pins 6, 9 via the first and second terminal plates 15, 16 based on the switching operation (not shown), an intermittent switching between the fixed contact 7d and the movable contact 8c is repeated and the warning sound is generated. In this case, because the noise preventing member 17 is connected to the fixed contact 7d and movable contact 8c in parallel, the noise due to repeating of the intermittent switching between the fixed contact 7d and the movable contact 8c is prevented and the horn 1 having an excellent performance can be obtained.

In this case, the noise preventing member 17 is not provided in the cylinder of the casing 2, but is housed in the

terminal unit 13 which is provided outside of the casing 2 in order to supply the electric power. Thus, the noise preventing member 17 is not affected by an atmosphere temperature in the casing 2 and can be protected based on the heat resistance guarantee temperature. Further, it is unnecessary to ensure an exclusive space in the cylinder of the casing 2 for the noise preventing member 17, and the casing can be miniaturized. Furthermore, it is unnecessary to provide an exclusive member for attachment of the noise preventing member, the structure inside the cylinder of the casing 2 can be simplified, and cost can be reduced.

Additionally, because the noise preventing member 17 is provided in the space S between the terminal plates 15, 16 which are arranged in the circumference direction with the predetermined gap beforehand, it is unnecessary to provide the space for the noise preventing member 17.

Additionally, because the noise preventing member 17 can be built in the terminal unit 13 together with the first and second terminal plates 15, 16, in the state where the first and second terminal plates 15, 16 are already wired, enabling the terminal unit 13 to be attached to the casing 2, the wiring of the noise preventing member 17 and assembling work are simplified, and the horn 1 can be effectively manufactured.

Additionally, because the thickness of the terminal unit 13 in the axial direction is set so as not to be larger than the projecting amount of the recessed part 2b of the casing

2, there is no problem such that the space for provision of the horn 1 is enlarged by the terminal unit 13, and a space between the horn 1 and members provided in the vicinity can be reduced in provision of the horn 1.

Further, the noise preventing member 17 is provided in the space S formed between burying parts, which face each other, of the first and second terminal plates 15, 16 of the terminal unit 13. The space S is filled with the resin material 18 so that the noise preventing member 17 is buried in and integrally fixed to the terminal unit 13. Thus, the noise preventing member 17 can be protected, a trouble such that the noise preventing member 17 falls off by vibration is avoided, and the noise preventing member 17 can be reliably fixed.

Additionally, when forming a product in which the noise preventing member 17 is to be provided and a product in which the member 17 is not to be provided, it is only required to prepare the terminal unit 13 in which the noise preventing member 17 is built and the terminal 13 in which the member 17 is not built. That is, the specification of the casing 2 side does not vary for each product. Thus, components can be made common and low-cost can be realized, in addition, quality management can be simplified. Further, when the terminal unit 13 in which the noise preventing member 17 is to be built and the terminal 13 in which the member 17 is not to be built are formed, it is only required to form two types of terminal units of which the shapes of the parts exposed outside are different

from each other. Thus, work is unnecessary such as attaching marks different from each other to the horn provided with the noise preventing member and the horn provided with no noise preventing member respectively beforehand, and distinguishing them becomes easy.

Moreover, the present invention, as a matter of course, is not limited to the above embodiment. One sheet of a terminal plate is provided in the terminal member in the case of a horn in which a body ground is performed. However, even in this case, a space can be provided adjacently to the terminal plate, the noise preventing member can be built in the space, and the space can be filled with the resin material. Thus, similarly to the above embodiment, the noise preventing member can be protected against the atmosphere temperature, etc., and can be reliably fixed.

[Industrial Applicability]

As described above, a vehicle horn according to the present invention serves as a horn that is mounted on a general vehicle such as a car and a motorcycle, a special-purpose vehicle or the like, in particular, is suitable for the general vehicle.